Parameter Estimation for Animal Populations and Communities

Workshop Outline

[background pdf's appear in square brackets]

Timing

8 am – 4:30 pm with 15-minute morning and afternoon breaks and a 1-hour lunch break.

Day 1 (May 21)

1. Introduction
 1.1 Introduction to course (organizers + JDN) (0.75 hr)
 1.2 Overview of population ecology (JDN) (0.25 hr)
 1.3 Estimation: why bother? (JDN) (1 hr) [1.3a] [1.3b]

BREAK

2. Statistical inference (I)
 2.1 Statistical distributions (LLB) (0.5 hr)
 2.2 Estimation: methods, properties (bias, precision, accuracy), CI's (LLB) (1 hr)
 2.3 Hypothesis testing (LLB) (0.5 hr)

LUNCH

 2.4 Model selection, Bayesian updating (JDN) (0.5 hr)

2. Statistical inference (II)
 2.5 Survey sampling; design features (LLB) (1 hr)

BREAK

3. Abundance estimation (I): observations
 3.1 Overview (JDN) (0.5 hr)
 3.2 Observation based methods (JDN) (1.0 hr) [3.2a][3.2b][3.2c][3.2d]
  Marked subpopulation
  Temporal removal modeling
  Sighting probability modeling
  Multiple independent observers
  Multiple dependent observers
  Distance sampling
  Replicate counts

Day 2 (May 22)

Day 1 recap (LLB, JEH, JDN) (0.5 hr)
 3.3 Multiple observer exercise with DOBSERV (JEH) (0.75 hr)

3. Abundance estimation cont. (II): captures (closed CR models)
 3.4 2-sample model (JDN) (0.5 hr)

BREAK

 3.5 2-sample model exercises (MARK) (JEH) (1.0 hr)
 3.6 *K*-sample closed models (JDN) (0.75 hr)

LUNCH

 3.7 *K*-sample closed model exercises, CAPTURE, MARK (JEH) (1.25 hr) [3.7a]
 3.8 Density estimation with closed CR models (Nichols) (0.5 hr)
  Ad hoc boundary strip approach
  Nested grids
  Gradient designs (e.g., trapping webs)

BREAK

3.9 Other capture-based methods (JDN; 0.25 hr)
Removal methods
Change-in-ratio methods
4. Vital rate estimation (survival, reproduction, movement)
4.1 Introduction, relevance of detection probability (JDN) (0.25 hr)
4.2 All marked animals detected (JDN) (1 hr)
Binomial survival model
Nest success
Radiotelemetry data

Day 3 (May 23)
Day 2 recap ((LLB, JEH, JDN) (0.5 hr)
4.3 Computer exercises (MARK) (JEH) (1 hr)
4.4 Tag recovery models (JDN) (1 hr) [4.4]
BREAK
4.5 Open single-age population CR models (survival) (JDN) (1.5 hr) [4.5]
Data structure
Modeling
Time-specific covariates
Multiple groups
Capture history effects
Individual covariates
Abundance and recruitment
LUNCH
4.6 Program MARK
PIMs and design matrices (JEH) (0.75 hr)
Exercises: Single-age models, band recovery models (JEH) (1 hr)
BREAK
4.8 Multiple-age models (JDN) (0.5 hr) [4.8]
4.9 Multiple-age models exercise (JEH) (0.75 hr)

Day 4 (May 24)
Day 3 recap ((LLB, JEH, JDN) (0.5 hr)
4.10 Multistate models (LLB) (0.75 hr) [4.10a] [4.10b] [4.10c]
4.11 Multistate models; exercises (JEH) (1 hr)
BREAK
4.12 Pollock's robust design (LLB) (0.75 hr) [4.12] [4.12b]
4.13 Robust design exercise (JEH) (0.75 hr)
LUNCH
4.14 Estimation of λ and components of λ (JDN) (0.5 hr) [4.14]
5. Occupancy modeling
5.1 Single-season, single species occupancy (Nichols) (0.75 hr) [5.1] [5.1b]
Data structure and designs
Modeling
BREAK
5.2 Computer exercise (PRESENCE) (JEH) (1 hr)
5.3 Multiple-season occupancy dynamics (JDN) (1 hr) [5.3]
Data structure
Modeling

Day 5 (May 25)
Day 4 recap ((LLB, JEH, JDN) (0.5 hr)
5.4 Occupancy multi-season exercises with PRESENCE (JEH) (1hr)
5.5 Multi-season occupancy modeling example: Amazonian birds (JDN) (0.75 hr) [5.5a][5.5b]
BREAK
5.6 Occupancy study design (LLB) (0.75) [5.6] [5.6b]
5.7 GENPRES software for study design (JEH) (0.75 hr)
LUNCH
5.8 Occupancy; multiple species, states, detection devices (JDN) (0.75 hr) [5.8]
6 Species richness and community dynamics
6.1 Intro to species richness estimation (JDN) (0.75 hr) [6.1]
BREAK
6.2 Community dynamics; multiple seasons (JDN) (0.75 hr) [6.2]
6.3 SPECRICH and COMDYN software (JEH) (0.75 hr)
7 Overall Recap (LLB, JEH, JDN)

Lecturers:
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Sotfware available at:

http://www.mbr-pwrc.usgs.gov/software

Programs: DOBSERV, CAPTURE, MARK, PRESENCE, GENPRES, COMDYN